

NAME \_\_\_\_\_

PERIOD \_\_\_\_\_ DATE \_\_\_\_\_

### FITTING A LINE TO DATA

We have studied how to find the equation of a line that passes through two points. Now, we will study problems that involve several data points. Usually, no single line passes through all the data points, so you try to find the line that best fits the data.

To approximate the best fitting line for a set of data points, use the following steps.

Procedure:

- 1) Draw a scatter plot.
- 2) Sketch the line that appears to most closely follow the pattern given by the points. There should be about as many points above the line as below the line.
- 3) Locate two points on the line.
- 4) Find the equation of the line using these two points.

**Demand for Soft Drinks.** A convenience store manager notices that sales of soft drinks are higher on hotter days, so he assembled the data in the following table.

High temperature	Cans sold
55	340
58	335
64	410
68	460
70	450
75	610
80	735
84	780

Question: Use the model to predict soft-drink sales if the temperature is  $95^{\circ}$

Problems: Determine the equation of the line that best fits the given data.

- 1) **Dividends.** The table below shows the cash dividends declared by the Duquesne Light Company from 1999 until 2007. Let  $x = 9$  represent 1999.

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Dividend	\$1.14	\$1.20	\$1.27	\$1.29	\$1.43	1.53	\$1.60	\$1.66	\$1.76

- 2) **Tree Diameter and Age.** To estimate ages of trees, forest rangers use a linear model that relates tree diameter to age. The model is useful because tree diameter is much easier to measure than tree age (which requires special tools for extracting a representative cross section of the tree and counting rings. Use the data in the table collected for a certain variety of oak trees to find a model.

Diameter (in.)	2.5	4.0	6.0	8.0	9.0	9.5	12.5	15.5
Age (years)	15	24	32	56	49	76	90	89

- 3) **Home Computers.** The table below lists the percent of households, in the United States that owned computers between 1987 and 2004. Let  $x = 7$  represent 1987.

Year	1987	1992	1996	2000	2001	2003	2004
Households	8.2	15	22.8	36.6	42.1	51	55

4)

x	-2	-1	-0.5	0	0.5	1	2	3	3.5	4
y	1.25	1.5	1.5	2	1.75	2	2.5	2.5	2.75	3.25

5)

x	-2	-1	0	0.5	1	2	2.5	3.5	4	4.5
y	5	3	3.5	1.5	2	0	-2	-3.5	-2	-3.5